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**Szabocsik**

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(54) **HYPERTONIC DEXTRAN SOLUTION AND METHODS OF TREATING AND PREVENTING RECURRENT CORNEAL EROSION**

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CPC ..... *A61K 31/715* (2013.01); *A61K 9/0048* (2013.01); *A61K 31/721* (2013.01); *A61K 31/728* (2013.01); *A61J 1/067* (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,920,810 A *	11/1975	Rankin	.....	424/78.04
4,271,144 A	6/1981	Holly		
4,597,965 A	7/1986	Holly		
5,460,834 A *	10/1995	Bhagat	.....	424/682
5,610,184 A *	3/1997	Shahinian, Jr.	.....	514/540
6,455,583 B1	9/2002	Pflugfelder et al.		
6,528,048 B1	3/2003	Koike et al.		
RE38,628 E *	10/2004	Clark et al.	.....	424/434
6,991,096 B2	1/2006	Gottlieb et al.		

7,115,653 B2	10/2006	Baxter et al.	
7,189,697 B2	3/2007	Panjwani	
7,204,995 B2	4/2007	El-Sherif et al.	
2004/0033960 A1 *	2/2004	Doshi et al. ....	514/21
2006/0079482 A1 *	4/2006	Lindstrom .....	514/54
2006/0106104 A1 *	5/2006	Vehige et al. ....	514/546
2008/0193407 A1 *	8/2008	Chowhan .....	A61K 9/0048
			424/78.04
2009/0157037 A1	6/2009	Iyer et al.	
2010/0144766 A1	6/2010	Pines et al.	

FOREIGN PATENT DOCUMENTS

WO 9631195 A1 10/1996

OTHER PUBLICATIONS

Holly, F. "Lacrophilic ophthalmic demulcents" US Ophthalm. Rev. (2008) vol. 3, pp. 38-41.\*

Baumgarten, M. et al "Normal human synovial fluid . . ." J. Bone Joint Surg. (1985) vol. 67-A, No. 9, pp. 1336-1339.\*

International Searching Authority, International Search Report and Written Opinion, International Application No. PCT/US2012/056273, Nov. 30, 2012.

Matsumoto, Y. et al "Autologous serum application . . ." Ophthalmol. (2004) vol. 111, No. 6, pp. 1115-1120.

Charnock, C. "Are multidose over-the-counter artificial tears adequately preserved?" Cornea (2006) vol. 25, No. 4, pp. 432-437 (abstract only).

Das, S. et al "Recurrent corneal erosion syndrome" Surv. Ophthalmol. (2008) vol. 53, No. 1, pp. 3-15.

\* cited by examiner

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(57) **ABSTRACT**

An ophthalmic solution is provided. The ophthalmic solution is hypertonic. The ophthalmic solution includes a polysaccharide having an average molecular weight of between about 40,000 grams per mole and about 150,000 grams per mole. A packaged ophthalmic solution for preventing the ophthalmic solution from being exposed to CO<sub>2</sub> and other contaminants is also provided. The ophthalmic solution can be used to treat recurrent corneal erosion. The ophthalmic solution can also be used as a prophylactic to prevent recurrent corneal erosion.

**19 Claims, 1 Drawing Sheet**